

IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims

1-44. (Canceled).

45. (Currently Amended) A valve unit comprising:

a valve body substrate including a chamber having an inlet  
and an outlet for fluid; and

a valve element accommodated in said chamber, wherein:

the shape of each of both ends of said valve element has a  
wedge-shaped, spherical, or conical form,

said inlet and said outlet of said chamber include inclined  
~~portions which are brought into contact with~~ for contacting  
respective ends of said valve element to enable said valve unit  
to be closed in response to fluid flow in either direction within  
~~said chamber are formed at said inlet and said outlet of said~~  
chamber, and

when said chamber is subjected to vibration, in a state in  
which said valve element is located at said ~~outlet~~ inclined  
portion of said outlet due to fluid pressure within said chamber  
so as to close said outlet, said valve element moves with respect

to said outlet inclined portion of said outlet and said outlet is opened.

46. (Currently Amended) A valve unit comprising:  
a valve body substrate including a chamber having an inlet  
and an outlet for fluid; and

a valve element accommodated in said chamber, wherein:  
~~an inclined portion is provided at said outlet,~~  
the shape of said valve element is spherical,  
said inlet and said outlet of said chamber include inclined  
portions for contacting respective ends of said valve element to  
enable said valve unit to be closed in response to fluid flow in  
either direction within said chamber,

an angle made by ~~an~~ the inclined portion ~~formed on an~~ of the  
~~inlet side of said chamber~~ is smaller than an angle made by said  
the inclined portion ~~formed on~~ of the outlet side ~~of said~~  
chamber, and

when said chamber is subjected to vibration, in a state in  
which said valve element is located at said outlet inclined  
portion of said outlet due to fluid pressure within said chamber  
so as to close said outlet, said valve element moves with respect  
to said outlet inclined portion of said outlet and said outlet is  
opened.

47. (Currently Amended) A valve unit comprising:  
a valve body substrate including a chamber having an inlet  
and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:  
~~an inclined portion is provided at said outlet,~~  
the shape of each end of said valve element has a  
wedge-shaped or conical form,  
an apex angle of an input-side end of said valve element is  
smaller than that of an output-side end thereof,  
said inlet and said outlet of said chamber include inclined  
portions for contacting respective ends of said valve element to  
enable said valve unit to be closed in response to fluid flow in  
either direction within said chamber,  
an angle made by ~~an~~ the inclined portion ~~formed on an~~ of the  
~~inlet side of said chamber~~ is smaller than an angle made by said  
the inclined portion ~~formed on~~ of the outlet side ~~of said~~  
chamber, and  
when said chamber is subjected to vibration, in a state in  
which said valve element is located at said outlet inclined  
portion of said outlet due to fluid pressure within said chamber  
so as to close said outlet, said valve element moves with respect  
to said outlet inclined portion of said outlet and said outlet is  
opened.

48. (Canceled) .

49. (Currently Amended) The valve unit of claim ~~48~~ 45, wherein said valve-element urging component or said valve element is formed of a magnetic material and is attracted by a magnetic force of the other.

50. (Canceled) .

51. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:  
an inclined portion is provided at said outlet,  
when said chamber is subjected to vibration, in a state in which said valve element is located at said inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said inclined portion and said outlet is opened, and

the movement of said valve element is promoted by vibrating said chamber with a frequency higher than that of a main vibration or by vibrating said chamber with an amplitude higher than that of the main vibration during a predetermined period

before and after the opening of said outlet by said valve element.

52. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:  
an inclined portion is provided at said outlet,  
when said chamber is subjected to vibration, in a state in  
which said valve element is located at said inclined portion due  
to fluid pressure within said chamber so as to close said outlet,  
said valve element moves with respect to said inclined portion  
and said outlet is opened, and  
contact friction between said valve element and an inner  
wall of said chamber is reduced by imparting a vibration having a  
predetermined frequency and amplitude during a predetermined  
period before and after the opening of said outlet by said valve  
element.

53. (Previously Presented) The valve unit of claim 52  
wherein the vibration having the predetermined frequency and  
amplitude is imparted to said chamber.

54. (Previously Presented) A valve unit comprising:

a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber; and  
a valve-element urging component that urges said valve  
element toward said outlet of said chamber, wherein

the opening or closing state of said outlet or an opening  
level thereof is varied as a frequency or an amplitude of a  
vibration applied to said chamber is varied and as a motional  
amplitude of said valve element is varied by the varied  
vibration.

55. (Previously Presented) The valve unit of claim 54,  
wherein said valve-element urging component or said valve element  
is formed of a magnetic material and is attracted by a magnetic  
force of the other.

56. (Canceled).

57. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber;  
an exciting component that vibrates said chamber so as to  
open and close said outlet of said chamber; and  
a driver that drives said exciting component, wherein:

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and

said exciting component superimposes a vibration having a frequency and an amplitude different from those of a main vibration on the main vibration.

58. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber;  
an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and  
a driver that drives said exciting component, wherein:  
said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and  
said exciting component imparts such a vibration that a gas is released from said outlet and fluid is not discharged from inside said chamber when fluid is within said chamber.

59. (Previously Presented) A valve unit comprising:

- a chamber having an inlet and an outlet for fluid;
- a valve element accommodated in said chamber;
- an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;
- a driver that drives said exciting component; and
- a gas venting portion is provided in a downstream-side channel of said chamber so that a liquid does not permeate said gas venting portion and only gas permeates said gas venting portion and is discharged, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration.

60. (Previously Presented) A valve unit comprising:

- a chamber having an inlet and an outlet for fluid;
- a valve element accommodated in said chamber;
- an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;
- a driver that drives said exciting component; and



a head-coming-out detecting component that detects a head portion of the fluid when said chamber is filled with the fluid, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration.

61. (Previously Presented) The valve unit of claim 60, wherein said head-coming-out detecting component is provided at a position downstream of said outlet of said chamber.

62. (Previously Presented) The valve unit of claim 60, wherein said head-coming-out detecting component is a vibration detection component or an optical detection component.

63. (Previously Presented) The valve unit of claim 60, wherein said head-coming-out detecting component is detachable.

64. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber;

an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;

a driver that drives said exciting component; and

a state detecting component that detects a change of state in said chamber when said chamber is filled with the fluid and detects physical properties or a flow velocity of the fluid from the detected change of state, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying an amplitude of said valve element by the varied vibration.

65. (Previously Presented) The valve unit of claim 64, wherein said state detecting component is a vibration detecting component or an optical detecting component.

66. (Previously Presented) The valve unit of claim 64, wherein said state detecting component is detachable.

67. (Previously Presented) The valve unit of claim 64, wherein:

said driver has a control portion for controlling a driving waveform of said exciting component, and

said control portion adjusts valve control data on the basis of the velocity or the physical properties of the fluid detected by said state detecting component.

68. (Previously Presented) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber;  
an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and  
a driver that drives said exciting component, wherein:  
said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and  
said chamber is that of a microvalve with the breadth of said chamber being on the order of several micro meters to several hundred micro meters.